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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/605,128	09/10/2003	John Bruley	FIS920030230US1	2127
23550	7590	07/27/2004	EXAMINER	
HOFFMAN WARNICK & D'ALESSANDRO, LLC			WEISS, HOWARD	
3 E-COMM SQUARE			ART UNIT	PAPER NUMBER
ALBANY, NY 12207			2814	

DATE MAILED: 07/27/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<p align="center">Office Action Summary</p>	Application No. 10/605,128	Applicant(s) BRULEY ET AL.	
	Examiner Howard Weiss	Art Unit 2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 May 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 ~~is/are~~ pending in the application.
- 4a) Of the above claim(s) 20 ~~is/are~~ withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-19 ~~is/are~~ rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 1-20 are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>0903 & 1003</u> . | 6) <input type="checkbox"/> Other: _____ |

Attorney's Docket Number: FIS920030230US1

Filing Date: 9/10/03

Continuing Data: none

Claimed Foreign Priority Date: none

Applicant(s): Bruley et al. (Chan, Kirsch, Park)

Examiner: Howard Weiss

Election/Restrictions

1. Applicant's election with traverse of the group II invention, Claims 1 to 19, in the reply filed on 5/19/04 is acknowledged. The traversal is on the ground(s) that a capacitor having monolayer qualities of silicon nitride cannot be produced by other known methods than that described in the claims. This is not found persuasive because there are many other production methods of monolayers (i.e. atomic layer deposition) which do not involve UHVCVD. Also the different classifications of the inventions of the two groups require non-coextensive fields of search.

The requirement is still deemed proper and is therefore made FINAL.

2. Claim 20 is withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Applicant is requested to cancel the non-elected claims as part of a complete response to this office action. Cancellation of the non-elected claims would not preclude the later filing of a divisional application on the non-elected invention (please see 35 USC 120 and 121).
3. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Specification

4. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Objections

5. Claim 13 recites the limitation "the second layer" in Line 10. There is insufficient antecedent basis for this limitation in the claim.
6. The claims are objected to because they lack a proper introduction. The present Office practice is to insist that each claim must be the object of a sentence starting with "I (or we) claim", "The invention claimed is" or the equivalent. Please see MPEP § 608.01(m).

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –
(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
8. Claims 1, 2, 4 to 6, 8, 9 and 11 are rejected under 35 U.S.C. 102(b) as being anticipated by Wallace et al. (U.S. Patent No. 6,277,681).

Wallace et al. show all aspects of the instant invention (e.g. Figure 2, Column 2 Lines 6 to 36 and Column 3 Line 64 to Column 4 Line 27) including:

- cleaning a silicon substrate **11** using HF
- generating a first silicon nitride layer **13** using NH₃ and with a thickness between 5Å and 15Å
- depositing a high dielectric constant material of tantalum oxide **15** of thickness 15Å and 50Å and at a temperature between 600-900°C

- generating a second layer **17** of silicon nitride in an ultra-high vacuum (between 10^{-6} to 10^{-2} Torr) and a thickness between 3Å and 8Å
- generating an electrode layer **19**

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claims 3, 7 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wallace et al. and Thakur et al. (U.S. Patent No. 5,913,149).

Wallace et al. show most aspects of the instant invention (Paragraph 8) except for the use of rapid thermal nitridation (RTN), cleaning the high dielectric constant material in situ and to do a thermal anneal. Thakur et al. teach to use RTN (Column 5 Lines 13 to 36), clean in situ (Column 4 Lines 43 to 53) and to do a thermal anneal to produce a dielectric having reduced defects and enhanced electrical properties (Column 2 Lines 41 to 44). It would have been obvious to a person of ordinary skill in the art at the time of invention to use RTN, clean in situ and to do a thermal anneal

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as taught by Thakur et al. in the process of Wallace et al. to produce a dielectric having reduced defects and enhanced electrical properties.

11. Claims 10 and 13 to 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wallace et al. and Thakur et al., as applied to Claim 1 above, and further in view of Muralidhar et al. (U.S. Patent No. 6,297,095).

Wallace et al. and Thakur et al. show most aspects of the instant invention (Paragraph 10) except for the use of silane and ammonia in the CVD of the second silicon nitride layer and the use of aluminum oxide for the high dielectric constant material. Muralidhar et al. teach to use silane and ammonia in the CVD of the second silicon nitride layer (Column 8 Lines 27 to 48) and the use of aluminum oxide (i.e. alumina) for the high dielectric constant material (Column 17 Lines 41 to 54) as to avoid leakage and reduce the required programming voltages. It would have been obvious to a person of ordinary skill in the art at the time of invention to use silane and ammonia in the CVD of the second silicon nitride layer and the use of aluminum oxide for the high dielectric constant material as taught by Muralidhar et al. in the process of Wallace et al. and Thakur et al. as to avoid leakage and reduce the required programming voltages.

Conclusion

12. Paper copies of cited U.S. patents and U.S. patent application publications will cease to be mailed to applicants with Office actions as of June 2004. Paper copies of foreign patents and non-patent literature will continue to be included with office actions. These cited U.S. patents and patent application publications are available for download via the Office's PAIR. As an alternate source, all U.S. patents and patent application publications are available on the USPTO web site (www.uspto.gov), from the Office of Public Records and from commercial sources. Applicants are referred to the Electronic Business Center (EBC) at <http://www.uspto.gov/ebc/index.html> or 1-866-217-9197 for information on this

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policy. Requests to restart a period for response due to a missing U.S. patent or patent application publications will not be granted.


13. Papers related to this application may be submitted directly to Art Unit 2814 by facsimile transmission. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2814 Fax Center number is **(703) 872-9306**. The Art Unit 2814 Fax Center is to be used only for papers related to Art Unit 2814 applications.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Howard Weiss at **(571) 272-1720** and between the hours of 8:00 AM to 4:00 PM (Eastern Standard Time) Monday through Friday or by e-mail via Howard.Weiss@uspto.gov. Any inquiry of a general nature or relating to the status of this application should be directed to the Group 2800 Receptionist at **(703) 308-0956**.

15. The following list is the Examiner's field of search for the present Office Action:

Field of Search	Date
U.S. Class / Subclass(es): 438/240, 791	7/22/04
Other Documentation: PLUS Analysis Report	7/22/04
Electronic Database(s): EAST, IEL	7/22/04

HW/hw
23 July 2004


Howard Weiss
Patent Examiner
Art Unit 2814